EXAMINING THE ROLE OF NEED FOR CLOSURE IN PSYCHOLOGICAL DISTRESS FOLLOWING GENETIC TESTING FOR BREAST CANCER

by

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ABSTRACT

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The present study investigated the relationship between Need for Closure (NFC) and psychological distress after receiving the results of genetic tests for breast cancer. One hundred and eight women recruited from the Cancer Genetics Program at the University of Pittsburgh Cancer Institute and Magee-Women's Hospital participated in the study. The women were assessed four times in all, once before receiving their test results (baseline) and three times after at one week, 3 months and 6 months. The results suggested that the testing situation itself does not lead to distress. Distress following genetic test results is related to an individual's attitude towards uncertainty and the coping styles selected to deal with the stressful event.

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CHAPTER 1

INTRODUCTION

Research over the last few years shows a link between mutations in the BRCA 1/ 2 genes and breast and ovarian cancers (Miki et al., 1994; Wooster et al, 1995). Women with mutations on either of these genes are exponentially more likely to develop these diseases over the lifetime than those without the mutations (Croyle & Lerman, 1995; Ford et al., 1998; King, Marks, Mandell, & the New York Breast Cancer Study, 2003; Struewing et al., 1997). With the advent of genetic testing it is possible for women (and men) to get tested for cancer risk, and if a high risk for the disease is identified, enact preventative measures. Moreover, studies show that between 63% and 96% of individuals would be willing to undergo genetic testing for breast cancer (Braithwaite, Sutton, & Steggles, 2002; Chaliki et al., 1995; Shiloh, Patel, Papa, & Goldman, 1998), with a large number citing uncertainty reduction as the primary reason for doing so (Chaliki et al., 1995; Murphy, 1999; Shiloh et al., 1998).

The downside, however, to the benefits of genetic testing is that the results may not alleviate uncertainty and could result in increased psychological distress (Baum, Friedman, & Zakowski, 1997). Unlike diseases such as Huntington's disease with full penetrance (positive result guarantees that the disease will eventually occur), genetic testing for breast and ovarian cancer provides no such certainty. With breast and ovarian cancer testing, a positive result only suggests a likelihood of developing the disease over a lifetime. Even a negative result fails to provide certainty as a number of other factors (environment, age, gender, etc) can contribute to the development of breast and ovarian cancer. Furthermore, in the case of inconclusive results (negative but family and personal history suggest the possibility of an undetected mutation), even less certainty is provided. With the large number of individuals seeking genetic testing to

reduce uncertainty, understanding the impact of the three possible results on psychological health becomes increasingly important.

A number of influential theories have suggested that individuals respond differently to uncertainty (Baum et al., 1997; Lazarus & Folkman, 1984). For example, differences in attitude toward uncertainty influenced the level of distress experienced after genetic testing (O'Neill et al., 2006). More specifically, O'Neill et al. in a study of 64 women who were administered a measure of tolerance for uncertainty along with scales measuring general distress, cancer-specific distress, and perceived breast cancer risk, found that women with negative attitudes towards uncertainty who also received inconclusive results, displayed higher levels of long-term distress than their counterparts with positive attitudes towards uncertainty.

Even the decision to undergo testing has been influenced by an individual's attitude toward uncertainty. Braithwaite et al. (2002), in a study of attitude toward uncertainty and willingness to participate in predictive genetic testing, found that individuals who were uncomfortable with uncertainty were more likely to undergo genetic testing than those who were more comfortable with uncertainty. Similarly, Shilol et al. (1998) examined the relationship between interest in genetic testing and various types of individual differences including attitude toward uncertainty. The results showed that along with other individual factors such as locus of control, preference for self-treatment, and desire for control, attitude toward uncertainty uniquely predicted the intention to undergo genetic testing; individuals with negative attitudes towards uncertainty were more likely to undergo genetic testing than those with positive attitudes towards uncertainty.

One construct related to attitude towards uncertainty is Need for Closure (NFC; Webster & Kruglanski, 1994). Need for closure is defined as a strong discomfort with uncertainty and a pervasive need for an answer in ambiguous situations. In the context of cancer screening, an individual with a high need for closure may experience a higher level of distress both before testing and after results that fail to provide the expected level of uncertainty

reduction, than would their low NFC counterparts. This high level of anxiety (especially in cases where family history suggests a high likelihood of developing cancer) before testing may result in the desire to eliminate uncertainty through genetic testing (Braithwaite et al., 2002; Shiloh, et al., 1998). They are also more prone to experience both general and cancer-specific distress following the reception of test results that fail to alleviate their uncertainty (O'Neill et al., 2006).

While a few studies have examined the interaction between personality and genetic testing results (O'Neill et al., 2006), interest in genetic testing (Lerman, Daly, Masny, & Balshem, 1994), and the impact of test results on psychological distress (Dougall et al., 2009; Hamann et al., 2005; O'Neill et al., 2006), few have examined the connection between need for closure, genetic testing results, and psychological distress.

Most of the available studies on need for closure and genetic testing focus on the influence it has on the decision to undergo genetic testing. Croyle, Dutson, Tran, and Sun (1995) examined the interaction between need for closure and genetic testing by assigning participants to one of two groups. Both groups were given descriptions about cancer risk and genetic testing. However, one group received additional information about the uncertainty that remains even after test results. The results showed that women high in need for closure who were provided with the standard description were more likely to opt for testing than if they were provided with the description with additional information. On the other hand, women low in need for certainty showed the reverse pattern. That is, they were less likely to opt for testing when provided with the standard description, but more likely to do so when given the additional information.

Shiloh et al. (1998) also explored the link between need for closure and interest in genetic testing for breast cancer. One hundred and fifty women completed a questionnaire asking them about their reasons for or against testing, perceptions of risk, and intention to get tested for breast cancer. Before being administered the questionnaire, the women were

provided with information regarding the genetic testing procedure, risks of developing the disease, and how to interpret the various results. The results were mixed. For women at risk of developing breast cancer, NFC was not a significant predictor of intention to undergo genetic testing. However, among women at average risk for the disease, NFC was a significant predictor of intention to undergo genetic testing ($r=0.36$), with high NFC scores corresponding to increased intentions to undergo testing.

Other studies have examined the role of uncertainty in the intention to undergo genetic testing, but used measures other than NFC. However, these studies also show that individual differences in attitude toward uncertainty influence the intention to undergo genetic testing. For example, Braithwaite et al. (2002) used the Attitude towards Uncertainty Scale to examine the likelihood to undergo genetic testing for colon and breast cancer in a sample of randomly selected men and women. Attitude toward uncertainty was found to be a unique predictor of intention to undergo genetic testing in both the colon and breast cancer samples ($B=.20$ and $.28$, $p<0.01$). Specifically, individuals with negative attitudes towards uncertainty were more likely to express interest in genetic testing.

A better understanding of how differences in attitude toward uncertainty impacts distress levels both before and after genetic testing is needed and would be invaluable in pre- and post- genetic counseling sessions. It would provide counselors with a better understanding of the differences between women opting in and out of testing, and the likelihood of experiencing increased psychological distress as a result of testing results. Furthermore, programs can be designed and geared towards these differences in order to ensure a good fit between personality and pre/post-testing information programs.

Thus, the aim of the current study is to explore the influence of NFC on psychological distress both before and after cancer screening, specifically the degree to which it influences a person's likelihood to undergo genetic testing, and the likelihood of experiencing long-term psychological distress following positive, negative, and inconclusive findings.

1.1 Breast Cancer and Genetic Risk Evaluation

About 13% (1 in 8) of women in the United States will develop breast cancer at some point in their lives, and the chances of dying from the diseases is about 1 in 35 (www.cancer.org). In 2010, an estimated 261,100 women were expected to develop the disease (www.cancer.org). Such startling statistics combined with a higher survival rate if the disease is detected early has led to a great deal of early detection research. Relatively recent discoveries implicate genetic mutations in the genes BRCA1 and BRCA2 in the development of breast and ovarian cancer (Miki et al., 1994; Wooster et al., 1995). Women with abnormalities in the BRCA 1 and/or BRCA 2 genes have a 24% to 84% lifetime risk for developing breast cancer, and a 16% to 54% risk for ovarian cancer (Ford et al., 1998; King et al., 2003).

Both BRCA 1 and BRCA 2 are theorized to be tumor suppressing genes. A mutation in the genes interferes with its ability to prevent the development of tumors in breast and ovarian tissue (Miki et al., 1994). When functioning properly, both genes serve as part of a sequence of genes that function together to repair or completely remove damaged DNA. In the case of a mutation in either of these genes, this important function is impossible. This allows the damaged DNA to reproduce unchecked and without regard to the normal functioning of the cell. This in turn can lead to the development of a number of diseases including breast and ovarian cancer (Friedenson, 2007).

1.2 Genetic Testing, Uncertainty, Coping and Psychological Distress

1.2.1 Genetic Testing and Psychological Distress

Since the identification of the BRCA1/2 gene mutations and their links to hereditary breast and ovarian cancer, numerous studies have been conducted to identify the psychological impact of receiving such testing. However, the findings were mixed. Some studies suggested that women do not experience significant increases in distress as a result of testing (Schwartz, Peshkin, Hughes, Main, Isaacs, & Lerman, 2002); others suggested that previous history determines whether or not women will experience distress (Croyle, Smith,

Botkin, Baty, & Nash, 1997); while yet others suggested that increases in psychological distress post-results is usually short lived (Croyle et al., 1997; Smith et al., 2008). Therefore, research has primarily focused on identifying individual characteristics that predict distress following genetic testing. Findings have revealed that distress after testing is predicted by factors such as elevated pretest levels of distress (Croyle et al., 1997; Dougall et al., 2009; Lodder et al., 2001), previous cancer history (Croyle et al., 1997; Lodder et al., 2001; Hamann et al., 2005), and coping styles (Dougall et al., 2009).

Few studies have considered the role of personality characteristics in determining the amount of distress experienced after genetic testing (Baum et al., 1997). One personality characteristic likely to influence levels of distress following genetic testing is attitude toward uncertainty. More specifically, the more tolerant one is of uncertainty, the less likely it is that high levels of distress will occur following the disclosure of testing results. On the other hand, if tolerance for uncertainty is low, then test results that fail to alleviate uncertainty will likely result in elevated levels of distress.

1.2.2 Uncertainty and Distress

As mentioned before, one of the most common reasons given for undergoing genetic testing is the need to reduce uncertainty (Chaliki et al., 1995; Murphy, 1999; Skirton, 2006). However, as breast and ovarian cancer testing is not fully penetrant (and therefore must leave some degree of uncertainty) no guarantees can be provided. Thus, the psychological impact of unmet expectations regarding genetic testing results is of great interest from both a scientific and practical perspective.

A good way to gain a better understanding of genetic testing related distress is through an existing framework of stress. One such framework is the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984). According to this model, when an individual is confronted with a potentially stressful situation two forms of appraisal take place, primary and secondary, and the amount of stress experienced is determined by the outcome of these processes.

Primary appraisal involves analyzing the situation and determining whether or not it is a threat, harm/loss (the damage has already occurred), or challenge (growth opportunities): physically, psychologically or emotionally. Secondary appraisal, on the other hand, involves determining if sufficient resources and coping strategies exist to deal with the situations. From this perspective, stress is not viewed as being internal to the individual or as coming wholly from the external environment. Rather, stress is viewed as an interaction between the individual (his belief, values, etc.) and his perceived ability to control the threatening elements of the situation (Folkman, 1984). Furthermore, as neither these elements nor the individual are static, the appraisal of the situation is in flux, and, as such, so is the degree of stress experienced (Folkman, 1984).

In a situation where uncertainty is high and there is a "lack of clarity in the environment", primary appraisal (i.e., the individual's ability to accurately diagnose the situation) becomes difficult (Folkman, 1984, p.841). The individual is then forced to infer the capacity for handling the situation based on limited, ambiguous information. As Folkman (1984) and Baum et al. (1997) pointed out, in such situations individual characteristics will play a strong role in determining levels of distress.

Arguably, the Need for Closure Scale (NFC; Webster and Kruglanski, 1994) is the most widely used measure of intolerance for uncertainty with versions in Croatian, Italian, English and Dutch among others (Mannetti, Pierro, Kruglanski, Taris, & Bezinovic, 2002). Need for closure has been found to be a valuable construct in areas such as memory and stereotyping (Dijksterhuis, Knippenberg, Kruglanski, & Schaper, 1996), information processing and decision strategy selection (Choi, Koo, Choi, and Auh, 2008; Houghton & Grewal, 2000; Kruglanski, Webster, & Klem, 1993; Vermeir, Van Kenhove, and Hendrickx, 2002), job-fit and employee satisfaction (Guan, Deng, Bond, Chen, & Chan, 2010), self-enhancing beliefs (Taris, 2000), and impression formation (Webster and Kruglanski, 1994).

Need for closure is a stable personality characteristic that reflects a person's desire to avoid uncertainty. As a result we would expect to see differences in the way people react in ambiguous situations. Though it could be argued that a significantly traumatic or distressing event could alter personality, it is unlikely in this case.

An important assumption of the NFC theory is that high NFC individuals prefer to make a bad choice in the name of uncertainty reduction rather than make no choice. For the high NFC individual, any answer is better than no answer provided that the answer received lends some measure of certainty, even if it is illusory. Furthermore, once a choice has been made and an answer received, the high NFC person avoids information that might undermine that answer.

Another important element of the NFC theory is the urgency and permanency tendencies (Kruglanski & Webster, 1996). The urgency tendency (or seizing) is characterized by a need to quickly arrive at closure. The permanency tendency (or freezing) is characterized by a desire for permanence once a decision has been reached (Kruglanski & Webster, 1996). Stated differently, a person high in NFC is motivated by the desire to arrive at closure as quickly as possible (urgency), and once there, avoid any contradictory information that might reintroduce uncertainty (permanency). In the case of breast and ovarian cancer genetic testing, regardless of the results, no certainty exists. Thus, clear differences should exist in terms of post-result distress between those who went in with a desire to "seize" and "freeze", and those who did not. We might see, for example, in the case of an individual high on NFC who undergoes genetic testing and receives a negative result, increased avoidant behaviors (skipping mammograms, self-checks, etc.) in order to avoid contradictory information.

As Baum et al. (1997) and Croyle and Lerman (1995) suggested, when uncertainty is not reduced to the degree expected before the testing situation, distress can increase. Therefore, it is important to understand the differential psychological impact of various genetic test results as a function of need for closure.

Although a few studies have examined the relationship between need for closure and the willingness to undergo genetic testing (Braithwaite, Sutton, & Steggles, 2002; Croyle, Dutson, Tran, & Sun, 1995; Shiloh, Petel, Papa, & Goldman, 1998; Skirton, 2006), few have examined how need for closure might influence psychological distress after testing. O'Neill et al. (2006) examined the relationship between need for closure and psychological distress following the reception of an inconclusive BRCA1/2 test. Sixty-four women were followed 1 and 6 months post-disclosure. The authors found that intolerance for uncertainty was a significant predictor of psychological distress at 1 month (Cancer specific, general, and genetic testing distress) and 6 months (general distress) following the disclosure of genetic testing results. More specifically, individuals with a high need for closure reported higher levels of distress at both time periods following testing results.

This is the only published study to date that examines the concept of need for closure and its effects on psychological distress in much the same way as proposed in the current study. However, the two studies differ on two points. First, the proposed project used the Need for Closure Scale (NFCS; Webster & Kruglanski, 1994) instead of the Intolerance of Uncertainty Scale (IUS; Buhr & Dugas, 2000). Second, the O'Neill et al., (2006) study only focused on the relationship between uncertainty and psychological distress in women who receive uninformative results. The current project will examine this relationship as it pertains to all three possible results, namely positive, negative, and inconclusive.

1.2.3 Breast Cancer and Coping

Coping is another variable widely identified as important in understanding the relationship between genetic testing results and psychological well-being. Coping is defined as the attempts by an individual to manage both internal and environmental stressors that threaten to overwhelm their ability to function optimally (Lazarus and Folkman, 1988).

Coping can be categorized in two ways that have different effects on experienced stress (Folkman and Lazarus, 1988). The first is problem-focused coping (active coping),

characterized by a tendency to actively seek ways to mediate the effects of situational stressors. The other form, emotion-focused coping (avoidant coping), is associated with a desire to avoid the stressor and instead focus on regulating internal processes caused by the stressful situation (i.e. minimizing the impact of the potential outcome).

Women diagnosed with breast cancer use various strategies to cope with the diagnosis, with women who report using active and direct forms of coping reporting less distress than those who use indirect means of coping (Dougall et al., 2009). Dougall et al. (2009) found that in a sample of women undergoing genetic testing for breast cancer, women who used avoidant coping styles reported higher levels of distress than those who used more active forms of coping. Similarly, Kershaw et al. (2004) found in a study of women and their caregivers that avoidant coping was generally detrimental, and tended to be associated with higher levels of distress. Culver et al. (2004) found in an ethnically diverse sample of women that those who used active forms of coping reported lower levels of distress than women who use more avoidant forms of coping such as venting.

Overall, the literature suggests that in studying and understanding distress both in genetic testing for breast cancer or after diagnosis, coping plays an important role. The present study takes these findings into account and examines the mediating effect of coping beyond what is explained by NFC, testing results, and other factors that have been shown to be associated with breast cancer and distress.

1.3 Specific Aims

The proposed study has two major aims. The first is to examine the role of NFC in the decision to undergo genetic testing in women who have been identified as being at risk for the development of breast cancer. The second is to examine the relationship between NFC and psychological distress following the receipt of genetic testing results.

1.4 Hypotheses

The study has three main hypotheses. The first hypothesis deals with the likelihood to undergo genetic testing as influenced by NFC. Specifically, it states that women high in NFC will be more likely than women low in NFC to agree to undergo genetic testing. Hypothesis two proposes that NFC will uniquely predict levels of both general and cancer-specific distress following the disclosure of test results beyond the variance accounted for by previous cancer history, prior levels of distress, and testing results at 1-week, 3-months, and 6-months post-results. More specifically, higher scores on the Need for Closure scale will result in higher levels of reported distress. Hypothesis three proposes that the relationship between NFC and both cancer-specific and general distress will be mediated by coping styles (i.e. active vs. avoidant coping) at 1-week, 3-months, or six months. More specifically avoidant coping styles will have a significant mediating effect on NFC scores resulting in high levels of psychological distress following testing results.

Since NFC can (and has) been operationalized in different ways, the present study examined the above hypotheses using 3 different conceptions of NFC. First, the individual NFC scales were examined, then the total score (summed subscale score), and finally, the urgency and permanency scores described in the section above. This was done to gain a broader understanding of NFC's influence on psychological distress following genetic testing for breast cancer.

CHAPTER 2

METHODS

2.1 Participants

One hundred and nine women who completed the NFCS were included in the analyses. The sample of women came from a larger sample recruited from the Cancer Genetics Program at the University of Pittsburgh Cancer Institute and Magee-Women's Hospital. Forty-nine percent of the women had a personal history with cancer (close relative diagnosed with breast cancer or had been diagnosed themselves with the illness themselves). The sample consisted entirely of white women with a mean age of 44 (standard deviation of 9.4). The reported family incomes ranged between 10,000 and 90,000 dollars a year with the majority of the women coming from families with average incomes of 40-50,000 dollars a year. Level of education ranged from some high school to graduate degrees, however the majority (31.2%) of the women had at least a college degree.

2.2 Measures

The demographic data used in the present study were collected during the baseline assessment. Though a number of demographic variables were collected, only the following were used in the present study: age, level of family income, use of psychoactive drugs, and personal cancer history. Additionally, the following measures were used across the four time periods of interest to this study: Need for Certainty (NFC), Symptom Checklist-90 revised (SCL-90-R), Impact of Events Scales (IES), The Center for Epidemiological Studies-Depression (CES-D), Perceived Stress Scale (PSS), Spielberger's State–trait Anxiety Inventory (STAI), and the Brief COPE. All the measures are presented in more detail below.

Need for Certainty

Need for certainty was measured using the Need for Closure Scale (NFCS; Webster & Kruglanski, 1994). The NFCS is a 42-item scale designed to measure a person's comfort with uncertainty and the desire to arrive at a conclusion as quickly as possible. The scale has five subscales: preference for predictability, preference for order, discomfort with ambiguity, decisiveness, and closed-mindedness. Participant's rated the items using a Likert scale ranging from 1 (strongly agree) to 6 (strongly disagree). The five subscales have the following internal consistensies: discomfort with ambiguity scale (Cronbach's alpha =.69); preference for order (Cronbach alpha =.66); decisiveness (Cronbach's alpha =.85); preference for predictability (Cronbach's alpha =.76); Closed-Mindedness (Cronbach =.51). The total NFC score was constructed by summing the scores of the individual scales except decisiveness. This was done to see if an overall score provided additional information beyond what can be obtained from the individual scales alone. Decisiveness was excluded due to studies suggesting that NFC should not be used as a unidimensional constructed, but if so it has stronger validity without the decisiveness scale (Mannetti et al., 2002; Neuberg et al., 1997). The total scale had a Cronbach alpha index of .83. Two additional scales were also constructed to see if more information could be obtained beyond what the individual scales provide. The urgency and permanency tendencies were constructed by combining the NFC subscales in the following ways: permanency (closed-mindedness and decisiveness; Cronbach's alpha = .74) and Urgency (Preference for Order, Preference for Predictability, and Discomfort with Ambiguity; Cronbach's alpha = .85). Both scales, like the total score were created to determine if additional information could be gained by using combined subscales rather than individual ones.

Distress

Distress was measured along two dimensions: General distress and Cancer distress. General distress was measured using the Symptom Checklist-90 Revised (SCL-90-R;

Derogatis, 1983). The Global Severity Index (GSI) was made up of 90 items from which an overall score serves as an indicator of general psychological distress. Internal consistencies for this sample ranged from 0.96 (baseline) to 0.97 (Times 2, 3, and 4 . Cancer-related distress was measured using the Impact of Event Scale (IES). The 15-item scale's summed score indicated the degree to which distress (specifically intrusive thoughts and avoidant behaviors regarding breast/ovarian cancer) occurred during the previous week. Internal consistency statistics (Cronbach alpha) for this sample ranged 0.89-0.92 (Dougall et al., 2009; Wilder-Smith et al., 2008).

High/Low Baseline Distress

Consistent with previous reports from this study (Dougall et al.; Smith et al.), an indicator of baseline distress will be used as a covariate in the analyses. Baseline distress was determined by examining the women's baseline scores on five measures of anxiety, depression, and distress: SCL-90, IES, The Center for Epidemiological Studies Depression (CES-D), Perceived Stress Scale (PSS), and Spielberger's State-trait Anxiety Inventory (STAI). The CES-D is a 20-item measure whose sum score indicates levels of clinical psychological distress (Cronbach's alpha=0.73-0.81). The PSS is a 14-item scale that measures the degree to which participants feel that the events in their lives are beyond their ability to effectively handle. Participants used a 5-point Likert scale to rate their perceived levels of stress ranging from 0 (never) to 5 (very often). The STAI-form Y1 is a 20-item scale that measures feelings of apprehension, tension, nervousness, and worry. Hierarchical agglomerative clustering with Ward's method and squared Euclidean distances were used to define the group, which were then replicated using the k-means cluster algorithm. Two well-defined clusters emerged: high versus low levels of distress at baseline.

Coping

Coping was measured using the 24-item Brief COPE scale. The measure was designed to measure the following 12 coping strategies: self-distraction, active coping, denial,

substance use, use of emotional support, behavioral disengagement, venting, positive reframing, planning, use of humor, acceptance, and religion. Participants endorsed the coping items using a 4-point scale ranging from “not at all” to “a lot”. Internal consistencies for the scales ranged from .52 to .98. For this study, the 8 of the 12 scales were recombined into two scales: active coping (active coping, positive reframing, planning, acceptance) and avoidant coping (self-distraction, denial, substance use, behavioral disengagement). This practice was consistent with Dougall et al. (2009). The COPE was assessed at Time 1 (baseline) and Time 3 (3-months post-results). The recombined scales had internal consistencies of .86 and .79 at Time 1 and .86 and .73 at Time 3.

2.3 Procedure

Participants completed four assessments in all: one before the decision to undergo or forego genetic testing (baseline data), and three after the decision at one week, three months, and six months post-results. Prior to the assessment, the women were required to undergo two genetic counseling sessions. Recruitment and enrollment of the participants occurred between these two counseling sessions. Participants were paid $25 for each session and did not have to pay for the genetic testing. The NFCS was only administered during the fourth assessment. However a study done by Skirton (2006) in which participants completed the NFCS twice 6 months apart demonstrated that NFC was a stable construct over time.

2.4 Data Analysis

The first hypothesis deals with the willingness to undergo genetic testing. More specifically, the question of interest was that women who underwent genetic testing would score higher on NFC than would women who did not. A multivariate analysis of variance (MANCOVA) was used to evaluate the main effect of willingness to undergo genetic testing on NFC. The following covariates were entered into the equation: age, total family income, use of psychoactive drugs, and previous cancer history.

The second hypothesis explored Need for Closure's unique contribution in the prediction of distress (general and cancer-specific) at 1 week, 3-months, and 6-months post-results beyond the variance accounted for by testing results. Multiple regression equations were used to test this hypothesis. The following variables were included in the equation as covariates: age, total family income, use of psychoactive medication, and personal cancer history.

The third hypothesis examined the role of coping variables in mediating the effects of NFC on post-results distress at 1 week, 3-months, and 6-months post-results. Mediation analyses using a method developed by Preacher and Hayes (2004) were used to determine if the use of active or avoidant coping significantly reduced the amount of variance accounted for by NFC in the prediction of post-results distress.

The covariates used in all of the analyses were selected because they have been found to be associated with distress and coping in previously published studies using this dataset (Dougall, et al, 2009; Hamann et al, 2008; Smith, et al, 2008).

The COPE was only measured at Time 1 and Time 3. As such, the bulk of the analyses focused on these two time periods. However, analyses were also conducted with Time 2 and Time 4 outcome variables. This was in order to determine if a trend existed in the mediation relationships between the significant NFC variables listed above and distress as measured at Time 1, 2, 3 and 4. Both Time 1 and Time 3 coping variables were entered into the equation to predict distress at Time 3 and Time 4. The Time 1 coping variables were entered as covariates. For correlations between the COPE and NFC variable see Table 1.

The bootstrapping procedure described by Preacher and Hays (2004) was used for the mediation analyses. The procedure involved repeated sampling from the original sample in order to estimate the sampling distribution of the indirect effect. The significance of this effect was determined by examining the confidence intervals. If the confidence interval for the indirect

effect did not contain zero, it was determined that a mediating effect existed. Conversely, if it did include zero, then no significant mediating effects existed.

The Preacher and Hayes (2004) method works by testing to see if the relationship between the independent variable through the mediator variable(s) on the dependent variable is statistically significant. The “a” path represents the relationship between the IV and the mediators; the “b” path represents the relationship between the DV and the mediators; the “c” path represents the relationship between the IV and the DV; and the “c’” path represents the relationship between the IV and the DV through the mediator variables (see Figure 1).

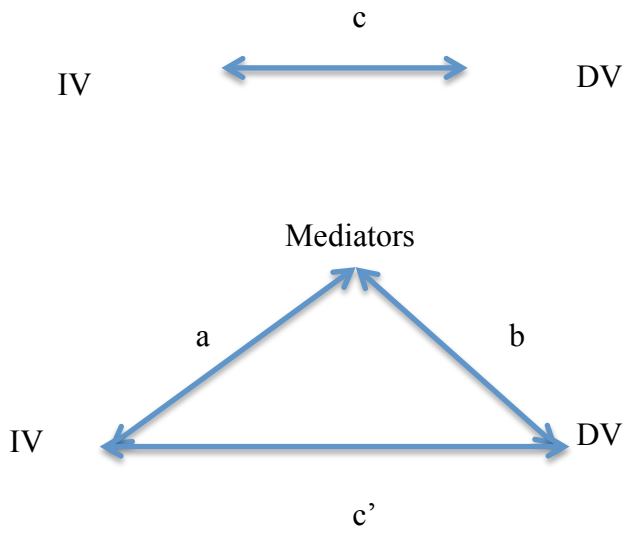

Figure 2.1 Graphic of Mediation Analysis Model

CHAPTER 3

RESULTS

3.1 Analysis of the Relationship between Distress, Testing and the 5 NFC Subscales

Hypothesis 1

A MANCOVA was used to determine if a significant difference existed between those who opted for testing and those who did not with the various NFC subscales as the dependent variables. Age, total family income, use of psychoactive drugs, and previous cancer history were entered into the equation as covariates. There was no significant difference between the two groups (had the test or did not) in terms of the various NFC subscales, Mult. $F (5, 98) = 1.569$, $p = .176$, partial $\eta 2 = .074$; preference for order: $F (5, 102) = .231$, $p = .948$; partial $\eta 2 = .011$; preference for predictability: $F (5, 102) = 1.854$, $p = .109$, partial $\eta 2 = .083$; discomfort with ambiguity: $F (5, 102) = .222$, $p = .952$, partial $\eta 2 = .011$; closed-mindedness: $F (5,102) = .877$, $p = .500$, partial $\eta 2 = .041$; decisiveness: $F (5, 102) = 1.121$, $p = .354$, partial $\eta 2 = .052$.

Hypothesis 2

Multiple regression models were used to determine the unique contributions of the NFC scales beyond the variances accounted for by background variables. The background variables included in the analyses were age, total family income, use of psychoactive medication, and personal cancer history. The background variables were entered into the first step of the model, followed by the NFC subscales.

Predicting Distress at Baseline (Time 1)

Baseline Cancer-Specific Distress

The first step of the model (with background variables) failed to significantly predict cancer-specific distress at baseline (see Table 3.1). The second step, which added the five NFC subscales to the equation, accounted for an additional 20% of the variance in cancer-specific distress. The final model accounted for 21% of the variance in baseline distress,

however, only younger age (marginally), greater use of psychoactive medication, lower NFC-decisiveness, and greater NFC-discomfort with ambiguity significantly predicted greater cancer distress at baseline (see Table 3.1).

Table 3.1 Coefficients for the 5 NFC Subscales Predicting Cancer-specific Distress at Baseline

Model		B	SE
	Age	-.243	.147
	income	-1.163	.701
1	cancer history	.394	2.652
	Psycho-Active Medication	3.373	2.648
		R^2 = .046, F (4, 102) =2.286, p = .065	
	age	-.258	.134
	income	-.911	.661
	cancer history	.110	2.427
	Psycho-Active Medication	5.02*	2.461
2	NFC Order	.212	.255
	NFC Predictability	-.211	.289
	NFC Decisiveness	-0.59**	.207
	NFC Ambiguity	0.66**	.251
	NFC Closed-Mindedness	-.040	.303
		ΔR^2 = .200, F (5,97) = 5.421, p<.0001	
		adj. R^2 = .216, F (9,97) = 4.248, p < .0001	

SE = standard error.
* p <. 05; ** p < .01; *** p < .001.

Baseline General Distress

The first step of the model (with background variables) accounted for 6% of the variance associated with general distress at baseline, but only lower total yearly family income was a significant individual predictor (see Table 3.2). The second step, which added the five NFC subscales to the equation, resulted in an additional 23% of the variance. The final model accounted for 26% of the variance in baseline general distress. Lower total yearly family income, greater use of psychoactive drugs, and lower NFC-decisiveness were the only variables that significantly predicted greater general distress at baseline (see Table 3.2).

Table 3.2 Coefficients for the 5 NFC Subscales Predicting General Distress at Baseline

Model		B	SE
	age	0.003	.004
	income	-0.049**	.017
1	cancer history	0.062	0.064
	Psycho-Active Medication	0.109	0.064
	R^2 = .063, F (4,103) = 2.802, p = .030		
	age	0.002	0.003
	income	-0.032*	0.016
	cancer history	0.037	0.057
	Psycho-Active Medication	0.17**	0.058
		0.001	0.006
2	NFC Order	0.005	0.007
	NFC Predictability		
	NFC Decisiveness	-0.02***	0.005
	NFC Ambiguity	0.005	0.006
	NFC Closed-Mindedness	0.011	0.007
	ΔR^2 = .226, F (5,98) = 6.545, p <. 0001		
	adj. R^2 = .262, F (9,98) = 5.217, p < .0001		

SE = standard error.
* p <. 05; ** p < .01; *** p < .001.

Predicting Distress at 1-week post-results (Time 2)

The baseline distress cluster variable described in the methods section and the results of the genetic testing were added into the models at step 2 as control variables, and will be used for the rest of the analyses in Times 2, 3, and 4.

Time 2 Cancer-Specific Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs failed to significantly predict cancer distress at Time 2 (see Table 3.3). The second step, which added the control variables baseline distress and test results, resulted in an additional 20% of the variance in cancer-specific distress at Time 2 (see Table 3.3). The addition of the five NFC subscales accounted for an additional 9% of the variance in cancer-specific distress at Time 2, with the final model accounting for 30% of the variance in Time 2 cancer-specific distress. In the final model, lower total yearly family income, greater baseline distress, greater NFC-discomfort with ambiguity, and lower NFC-closed-mindedness were the only significant individual predictors of Time 2 cancer-specific distress (see Table 3.3).

Table 3.3 Coefficients for the 5 NFC Subscales Predicting Cancer-Specific Distress at Times 2, 3, and 4

		Time 2		Time 3		Time 4	
Model		B	SE	SE	SE	B	SE
1	age	-0.26	0.16	-0.24	0.16	-0.01	0.14
	income	-1.43	0.76	-1.50	0.78	-0.36	0.69
	cancer	1.90	2.84	4.64	2.95	3.50	2.59
	Psycho Active Medication	0.26	2.88	0.28	2.98	0.77	2.61
2	age	-0.19	0.14	-0.11	0.15	0.12	0.13

Table 3.3 - Continued

	Income	-1.10	0.68	-1.04	0.73	0.00	0.61
	Cancer	1.19	2.56	3.16	2.76	2.56	2.28
	Psycho Active Medication	1.46	2.60	1.21	2.78	1.63	2.30
	Distress Cluster	11.44***	2.60	12.20***	2.85	12.65***	2.33
	test result	-2.39	1.22	-0.50	1.28	-0.94	1.08
3	Age	-0.20	0.14	-0.09	0.15	0.10	0.13
	Income	*-1.54	0.68	-1.37	0.73	0.08	0.63
	Cancer	1.68	2.48	3.54	2.74	2.39	2.33
	Psycho Active Medication	0.81	2.55	0.57	2.77	1.72	2.37
	Distress Cluster	10.98***	2.86	12.08*	3.19	11.12***	2.66
	test result	-2.18	1.23	0.17	1.34	-0.70	1.17
	NFC Order	0.00	0.26	-0.15	0.28	-0.11	0.24
	NFC Predictability	-0.36	0.30	-0.46	0.32	-0.09	0.28
	NFC Decisiveness	0.17	0.22	0.16	0.24	-0.23	0.21
	NFC Ambiguity	0.72*	0.28	0.80*	0.30	0.16	0.25
	NFC Closed-Mindedness	-0.73*	0.30	-0.21	0.34	0.04	0.29

Time 2	Time 3	Time 4
adj. R^2 = .044, F (4,100) = 2.138, p = .082	adj. R^2 = .045, F (4,99) = 2.174, p = .078	adj.R^2 = -.017, F (4,98) = .570, p = .685
Δ R^2 = .203, F (2,94) = 13.350, p < .0001	Δ R^2 = .159, F (2,93) = 9.745, p < .0001	Δ R^2 = .248, F (2,96) =16.333, p < .0001
Δ R^2 = .093, F (5,89) = 2.669, p = .027	Δ R^2 = .071, F (5,88) = 1.825, p = .116	Δ R^2 = .025, F (5,91) = .644, p = .667

Table 3.3 - Continued

adj.R^2 = .301, F (11,100) = 4.920, p < .0001	adj. R^2= .228, F (11,99) = 3.658, p < .0001	adj. R^2 = .211, F (11,91) = 3.474, p < .0001

Time 2 General Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs significantly predicted general distress at Time 2 (see Table 3.4). The second step, which added the control variables baseline distress and test results, resulted in an additional 26% of the variance in general distress at Time 2 (see Table 3.4). The addition of the five NFC subscales accounted for an additional 3% of the variance in general distress at Time 2, with the final model accounting for 33% of the variance in Time 2 general distress. In the final model, lower total yearly family income, greater baseline distress, and greater NFC-discomfort with ambiguity were the only significant individual predictors of Time 2 cancer-specific distress (see Table 3.4).

Table 3.4 Coefficients for the 5 NFC Subscales Predicting General Distress at Times 2,3, and 4

Model		Time 2		Time 3		Time 4	
		B	SE	SE	SE	B	SE
1	age	-0.26	0.16	-0.24	0.16	-0.01	0.14
	income	-1.43	0.76	-1.50	0.78	-0.36	0.69
	cancer	1.90	2.84	4.64	2.95	3.50	2.59
	Psycho Active Medication	0.26	2.88	0.28	2.98	0.77	2.61
2	age	-0.19	0.14	-0.11	0.15	0.12	0.13
	income	-1.10	0.68	-1.04	0.73	0.00	0.61

Table 3.4 – Continued

	Cancer	1.19	2.56	3.16	2.76	2.56	2.28
	Psycho Active Medication	1.46	2.60	1.21	2.78	1.63	2.30

	Distress Cluster	11.44***	2.60	12.20***	2.85	12.65***	2.33
	test result	-2.39	1.22	-0.50	1.28	-0.94	1.08
3	age	-0.20	0.14	-0.09	0.15	0.10	0.13
	income	*-1.54	0.68	-1.37	0.73	0.08	0.63
	cancer	1.68	2.48	3.54	2.74	2.39	2.33
	Psycho Active Medication	0.81	2.55	0.57	2.77	1.72	2.37
	Distress Cluster	10.98***	2.86	12.08*	3.19	11.12***	2.66
	test result	-2.18	1.23	0.17	1.34	-0.70	1.17
	NFC Order	0.00	0.26	-0.15	0.28	-0.11	0.24
	NFC Predictability	-0.36	0.30	-0.46	0.32	-0.09	0.28
	NFC Decisiveness	0.17	0.22	0.16	0.24	-0.23	0.21
	NFC Ambiguity	0.72*	0.28	0.80*	0.30	0.16	0.25
	NFC Closed-Mindedness	-0.73*	0.30	-0.21	0.34	0.04	0.29

Time 2	Time 3	Time 4
adj. R^2 = .044, F (4,100) = 2.138, p = .082	adj. R^2 = .045, F (4,99) = 2.174, p = .078	adj.R^2 = -.017, F (4,98) = .570, p = .685
Δ R^2 = .203, F (2,94) = 13.350, p < .0001	Δ R^2 = .159, F (2,93) = 9.745, p < .0001	Δ R^2 = .248, F (2,96) =16.333, p < .0001
Δ R^2 = .093, F (5,89) = 2.669, p = .027	Δ R^2 = .071, F (5,88) = 1.825, p = .116	Δ R^2 = .025, F (5,91) = .644, p = .667

Table 3.4 - Continued

adj.R^2 = .301, F (11,100) = 4.920, p < .0001	adj. R^2= .228, F (11,99) = 3.658, p < .0001	adj. R^2 = .211, F (11,91) = 3.474, p < .0001

Predicting Distress at 3-months post-results (Time 3)

Time 3 Cancer-Specific Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs failed to significantly predict cancer distress at Time 3 (see Table 3.3). The second step, which added the control variables baseline distress and test results, resulted in an additional 16% of the variance in cancer-specific distress at Time 3 (see Table 3.3). The addition of the five NFC subscales accounted for an additional 7% of the variance in cancer-specific distress at Time 3, with the final model accounting for 23% of the variance in Time 3 cancer-specific distress. In the final model, lower total yearly family income (marginally), greater baseline distress, and greater NFC-discomfort with ambiguity were the only significant individual predictors of Time 3 cancer-specific distress (see Table 3.3).

Time 3 General Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs did not significantly predict general distress at Time 3 (see Table 3.4). The second step, which added the control variables baseline distress and test results, resulted in an additional 30% of the variance in general distress at Time 3 (see Table 3.4). The addition of the five NFC subscales accounted for an additional 10% of the variance in general distress at Time 3, with the final model accounting for 40% of the variance in Time 3 general distress. In the final model, greater use of psychoactive drugs (marginally), greater baseline distress, lower NFC-decisiveness (marginally), greater

NFC-discomfort with ambiguity (marginally), and greater NFC closed-mindedness were the only significant individual predictors of Time 3 cancer-specific distress (see Table 3.4).

Predicting Distress at 6-months post-results (Time 4)

Time 4 Cancer-Specific Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs failed to significantly predict cancer distress at Time 4 (see Table 3.3). The second step, which added the control variables baseline distress and test results, resulted in an additional 25% of the variance in cancer-specific distress at Time 4 (see Table 3.3). The addition of the five NFC subscales accounted for an additional 3% of the variance in cancer-specific distress at Time 4, with the final model accounting for 21% of the variance in Time 4 cancer-specific distress. In the final model, only greater baseline distress significantly predicted Time 4 cancer-specific distress (see Table 3.3).

Time 4 General Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs did not significantly predict general distress at Time 4 (see Table 3.4). The second step, which added the control variables baseline distress and test results, resulted in an additional 40% of the variance in general distress at Time 4 (see Table 3.4). The addition of the five NFC subscales accounted for an additional 13% of the variance in general distress at Time 4, with the final model accounting for 51% of the variance in Time 4 general distress. In the final model, greater use of psychoactive medication, greater baseline distress, lower NFC-preference for order, and lower NFC-decisiveness were the only significant individual predictors of Time 4 cancer-specific distress (see Table 3.4).

Hypothesis 3

Mediation Analyses

Dougall et al (2009) showed that the amount of distress experienced by individuals who undergo genetic testing was influenced by the coping strategies they used. As such, it was necessary to examine the mediating effects of the coping variables on the relationship between NFC and both cancer-specific and general distress. However, for mediation to occur there must be significant relationships between the NFC and the distress variables. From the previous regression analyses, the NFC variables included in the analyses were discomfort with ambiguity and decisiveness.

NFC Subscales (Ambiguity and Decisiveness)

Mediating Distress at Baseline (Time 1)

The background variables age, total family income, use of psychoactive medication, and personal cancer history were entered into the model as covariates. Additionally, as the model only allowed a single independent variable at a time, ambiguity was initially entered as the predictor variables with decisiveness entered as a covariate, then the two were switched (this was also done for the urgency and permanency scales later in the paper). This is how Preacher (Statistical Mediation and Moderation Analysis, 2011) suggests handling multiple independent variables.

Baseline Cancer-Specific Distress

A significant mediation was observed for avoidant coping (but not active coping) on the influence of ambiguity on cancer specific distress at baseline (see Table 3.5). However, no mediation was observed for decisiveness (see Table 3.6).

Table 3.5 Mediation of NFC Ambiguity Scale on Cancer-Specific Distress through Avoidant and Active Coping at Time 1

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**Lower**	**Upper**
Ambiguity (avoidant)	.20	.001	1.79	.00	.63	.01	.23	.28	.36	.1380	.0551
Ambiguity (active)	.24	.026	.23	.23					.06	-.0128	.3030
Total									.43	.1748	.7539

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Table 3.6 Mediation of NFC Decisiveness Scale on Cancer-Specific Distress through Avoidant and Active Coping at Time 1

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**B**	**p**	**β**	**p**	**β**	**P**	**β**	**p**	**β**	**Lower**	**Upper**
Decisive (avoidant)	-.09	.04	1.77	.00	-.53	.00	-.37	.02	-.17	-.3471	.0395
Decisive (active)	.05	.54	.23	.23	-.53				.01	-.0221	.1209
Total									-.16	-.3471	.0395

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Baseline Distress (General)

No significant mediation of avoidant coping or active coping on the influence of decisiveness on general distress at baseline was observed (see Table 3.7). Only decisiveness was run in this model as it was the only NFC variable that significantly predicted general distress at baseline.

Table 3.7 Mediation of NFC Decisiveness Scale on General Distress through Avoidant and Active Coping at Time 1

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**B**	**p**	**β**	**p**	**β**	**p**	**B**	**p**	**β**	**Lower**	**Upper**
Decisiveness (avoidant)	-.15	.00	.05	.00	-.02	.00	-.01	.00	-.01	-.0152	-.0029
Decisiveness (active)	-.01	.86	.01	.01					.00	-.0022	.0021
Total									-.01	-.0155	-.0031

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Mediating Distress at Time 2 (1-week post results) with Time 1 Coping Variables

Cancer-Specific

A significant mediation was observed of avoidant coping (but not active coping) on the influence of ambiguity on cancer specific distress at Time 2 (see Table 3.8). However, no mediation was observed for decisiveness (see Table 3.9).

Table 3.8 Mediation of NFC Ambiguity Scale on Cancer-Specific Distress through Avoidant and Active Coping at Time 2

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**B**	**p**	**β**	**p**	**β**	**p**	**β**	**p**	**B**	**Lower**	**Upper**
Ambiguity (avoidant)	.22	.00	1.87	.00	.87	.00	.32	.19	.42	.1849	.7653
Ambiguity (active)	.33	.00	.41	.06					.13	.0195	.3651
Total									.55	.2565	.9168

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Table 3.9 Mediation of NFC Decisiveness Scale on Cancer-Specific Distress through Avoidant and Active Coping at Time 2

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**Lower**	**Upper**
Decisiveness (avoidant)	-.08	.09	1.87	.00	-.18	.39	-.06	.74	-.16	-.3447	.0184
Decisiveness (active)	.08	.38	.41	.06					.03	-.0233	.1590
Total									-.13	-.3151	.1101

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

General Distress

A significant mediation was observed of avoidant coping (but not active coping) on the influence of decisiveness on general distress at Time 2 (see Table 3.10).

Table 3.10 Mediation of NFC Decisiveness Scale on General Distress through Avoidant and Active Coping at Time 2

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**B**	**p**	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**Lower**	**Upper**
Decisiveness (avoidant)	-.15	.00	.05	.00	-.02	.00	-.01	.03	-.01	-.0147	-.0031
Decisiveness (active)	-.01	-.87	-.00	.99					-.00	-.0008	.0021
Total									-.01	-.0135	-.0025

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Mediating Distress at Time 3 (3-months post results)

Cancer-Specific Distress

A significant mediation was observed of avoidant coping (but not active coping) on the influence of ambiguity on cancer specific distress at Time 3 (see Table 3.11). Ambiguity was the only NFC subscale run in the model as it is the only one that significantly predicted cancer distress at Time 3.

Table 3.11 Mediation of NFC Ambiguity Scale on Cancer-Specific Distress through Avoidant and Active Coping at Time 3

	Path a		Path b		Path c		Path c'		Indirect effect: Point estimate	Indirect effect: Bca 95% CI	
Scales	**B**	**p**	**β**	**p**	**β**	**p**	**β**	**p**	**B**	**Lower**	**Upper**
Ambiguity (avoidant)	-.02	.62	2.52	.00	.36	.22	.29	.28	.06	-.1215	.3711
Ambiguity (active)	-04	.72	.37	.15					.01	-.0599	.1635
Total									.07	-.1649	.3631

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

General Distress

No significant mediation of avoidant coping or active coping on the influence of ambiguity or decisiveness on general distress at Time 3 was observed (see Tables 3.12 and 3.13, respectively).

Table 3.12 Mediation of NFC Ambiguity Scale on General Distress through Avoidant and Active Coping at Time 3

									Indirect effect		
	Path a		**Path b**		**Path c**		**Path c'**		**Point estimate**	**Bca 95% CI**	
Scales	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**p**	**B**	**Lower**	**Upper**
Ambiguity (avoidant)	.00	.94	.01	.67	.01	.27	.01	.27	.00	-.0018	.0024
Ambiguity (active)	.01	.90	-.00	.70					.00	-.0026	.0013
Total									-.00	-.0028	.0024

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Table 3.13 Mediation of NFC Decisiveness Scale on General Distress through Avoidant and Active Coping at Time 3

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**B**	**p**	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**Lower**	**Upper**
Decisiveness (avoidant)	-.08	.01	.01	.67	-.01	.08	-.01	.12	-.00	-.0052	.0020
Decisiveness (active)	-.01	.94	-.00	.70					.00	-.0012	.0019
Total									-.00	-.0059	.0020

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Mediating Distress at Time 4 (6-months post results) with Time 3 Coping Variables

Cancer Specific Distress

No significant mediation of avoidant coping or active coping on the influence of ambiguity on cancer-specific distress at Time 4 was observed (see Tables 3.14).

Table 3.14 Mediation of NFC Ambiguity Scale on Cancer-Specific Distress through Avoidant and Active Coping at Time 4

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**B**	**p**	**B**	**p**	**β**	**p**	**β**	**P**	**B**	**Lower**	**Upper**
Ambiguity (avoidant)	.03	.42	1.37	.04	.02	.93	-.03	.92	.04	-.0533	.2428
Ambiguity (active)	.03	.79	.03	.90					.00	-.0551	.0706
Total									-.05	-.0651	.2555

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

General Distress

No significant mediation of avoidant coping or active coping on the influence of ambiguity or decisiveness on general distress at Time 4 was observed (see Tables 3.15 and 3.16, respectively).

Table 3.15 Mediation of NFC Ambiguity Scale on General Distress through Avoidant and Active Coping at Time 4

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**Lower**	**Upper**
Ambiguity (avoidant)	.00	.94	.01	.72	.00	.36	.00	.37	.00	-.0021	.0017
Ambiguity (active)	.01	.90	-.00	.53					-.00	-.0017	.0008
Total									.00	-.0021	.0017

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Table 3.16 Mediation of NFC Decisiveness Scale on General Distress through Avoidant and Active Coping at Time 4

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**B**	**p**	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**Lower**	**Upper**
Decisiveness (avoidant)	-.08	.01	.01	.72	-.01	.01	-.01	.01	-.00	-.0034	.0019
Decisiveness (active)	-.01	.94	-.00	.53					.00	-.0007	.0010
Total									-.00	-.0034	.0019

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

3.1.1. Discussion

The primary purpose of this section of analyses was to determine the unique contributions of each of the NFC subscales in the prediction of cancer-specific and general distress. Additionally, this section examined the role coping strategies play in mediating the effects of the NFC variables that were found to be significant predictors of the two kinds of distress.

The first hypothesis stated that women who opted for genetic testing would have higher scores on the NFC subscales than women who did not receive testing. The data did not support this hypothesis. The mean scores on all five subscales did not significantly differ for women who opted for testing and those who did not. The failure to support this hypothesis may

have been due to the low number of women in the study who did not opt for the test. Of the 108 women in the study, only 20 decided not to undergo genetic testing. Future studies with more equal cells may be able to detect differences in these two groups in terms of the NFC subscales.

The second hypothesis stated that the five NFC subscales would significantly predict cancer-specific distress and general distress beyond the variance accounted for by variables previously determined to predict the two forms of distress. The hypothesis was partially supported. Only two of the NFC subscales significantly predicted cancer-specific distress: discomfort with ambiguity (higher) and closed-mindedness (lower). However, lower closed-mindedness only did so at Time 2 (one week post-results), whereas high discomfort with ambiguity did so at Time 1 (baseline), Time 2 (1-week), and Time 3 (3-months). None of the scales predicted distress at Time 4 (6-months)—this could however be due to the reduced number of subjects at that time point. The data therefore suggest that in understanding cancer-specific distress as it relates to need for closure, discomfort with ambiguity seems to be the only reliable predictor. It makes intuitive sense that this should be the case. A high discomfort with ambiguity (associated with a need to know at all costs) is likely to result in distress when testing results fail to provide the level of certainty one had expected going in. Close-mindedness, the other variable that showed up at a single time point, was associated more with locking an attitude or belief into place once an answer is gotten. In the case of breast cancer genetic testing, there is no definitive answer (right or wrong) to lock into place as ambiguity is an inherent part of the testing (and results) process.

As for general distress, four of the five subscales significantly predicted distress at some time point, however only high discomfort with ambiguity and low decisiveness did so more than once, and had the largest effects sizes of all the variables. As mentioned above, it makes intuitive sense that a high discomfort with ambiguity would result in distress when ambiguity is not alleviated. It also makes sense that an individual low on decisiveness (the ability to be firm

and resolute in making and sticking to decisions) will experience higher levels of distress. The only time period decisiveness did not factor into was Time 2. Possibly this was because if a decision about the results had not been reached after a week, it was still possible for the individual to argue that there was still time to do so. However, it becomes harder to do so 3 months and 6 months later, at which point distress may have occur.

The third hypothesis sought to determine the role of coping in moderating the effects of the NFC scales found to be significant predictors of distress. From the previous analysis we know that only discomfort with ambiguity and decisiveness were significant (and consistent) predictors of cancer-specific and general distress. As such, they were the only subscales used in the mediation analyses. The data from the mediation analyses showed that, consistent with general findings, the use of avoidant coping did little to alleviate distress and can, when combined with a discomfort with ambiguity, lead to greater levels of distress. It could be argued that a strong discomfort with ambiguity leads one to select an avoidant coping style. It makes sense that if one is uncomfortable with uncertainty, and the situation one finds oneself in is just that, the “best” strategy might be to avoid thinking about or interacting with people or situations that make the uncertainty more salient

3.2 Analysis of the Relationship between Distress, Testing and the NFC Total Scale

Hypothesis 1

An ANCOVA was used to determine if a significant difference existed between those who opted for testing and those who did not with the NFC total scale as the dependent variables. Age, total family income, use of psychoactive drugs, and previous cancer history were enter into the equation as covariates. There was no significant difference between the two groups (had the test or did not) in terms of the overall NFC scale (NFC total scale: $F (5, 107) = .770$, $p = .574$, partial $\eta^2 = .036$).

Hypothesis 2

Predicting Distress at Baseline (Time 1)

Baseline Cancer-Specific Distress

The first step of the model (with background variables) accounted for 5% of the variance associated with cancer-specific distress at baseline (see Table 3.17), but none of the individual variables were significant. The second step, which added the total NFC score to the equation, resulted in a significant increase in R^2, accounting for an additional 4% of the variance. The final model accounted for 8% of the variance in baseline cancer specific distress. However, only greater need for closure total score significantly predicted cancer distress at baseline (see Table 3.17).

Table 3.17 Coefficients for the NFC Total Scale Predicting Cancer-Specific Distress at Baseline

Model		B	SE
	age	-0.24	0.15
	total yearly family income	-1.16	0.70
1	personal cancer history	0.39	2.65
	Psycho-Active Medication	3.37	2.65
	R^2 = .046, F (4, 102) = 2.286, p = .065		
	age	-0.24	0.14
	total yearly family income	-1.04	0.69
2	personal cancer history	0.02	2.62
	New Psycho-Active Medication Y/N	4.21	2.64
	Time 1 to Time 4 NFC Total Score	*0.17	0.08
	ΔR^2 = .036, F (1,101) = 4.124, p = .045		
	R^2 = .075, F (5, 106) = 2.710, p = .024		

SE = standard error.
* p <. 05; ** p < .01; *** p < .001.

Baseline Distress (General)

The first step of the model (with background variables) accounted for 6% of the variance associated with general distress at baseline, but only total yearly family income was a significant individual predictor (Table 3.18). The second step, which added the total NFC score to the equation, resulted in an additional 5% of the variance in general distress. The final model accounted for 10% of the variance in baseline general distress. Lower total yearly family income, greater use of psychoactive drugs, and greater NFC-total score were the only variables that significantly predicted general distress at baseline (see Table 3.18).

Table 3.18 Coefficients for the NFC Total Scale Predicting Cancer-Specific Distress at Baseline

Model		B	SE
	Age	0.00	0.00
	income	**-0.05	0.02
1	cancer history	0.06	0.06
	Psycho-Active Medications	0.11	0.06
	R2 = .063, F (4,103) = 2.802, p = .030		
	age	0.00	0.00
	income	**-0.05	0.02
2	cancer history	0.05	0.06
	Psycho-Active Medications	*0.13	0.06
	NFC Total Score	*0.00	0.00
	∆R2 = .045, F (1,102) = 5.390, p = .022		
	R2 = .101, F (5,102) = 3.415, p < .001		

SE = standard error.
* p <. 05; ** p < .01; *** p < .001.

Predicting Distress at 1-week post-results (Time 2)

Time 2 Cancer-Specific Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs failed to significantly predict cancer distress at Time 2 (see Table 3.19). The second step, which added the control variables baseline distress and test results, resulted in an additional 20% of the variance in cancer-specific distress at Time 2 (see Table 3.19). The addition of the NFC total score accounted for an additional less than 1% of the variance in cancer-specific distress at Time 2, with the final model accounting for 23% of the variance in Time 2 cancer-specific distress. In the final model, greater baseline distress and negative genetic test results were the only significant individual predictors of Time 2 cancer-specific distress (see Table 3.19).

Table 3.19 Coefficients for the 5 NFC Total Scale Predicting Cancer-Specific Distress at Times 2,3, and 4

Model		Time 2		Time 3		Time 4	
		B	SE	B	SE	B	SE
1	age	-.263	.157	-.235	.159	-.005	.142
	income	-1.427	.762	-1.497	.781	-.365	.694
	cancer history	1.901	2.843	4.637	2.954	3.502	2.592
	Psycho-Active Medication	.256	2.877	.282	2.984	.768	2.610
2	age	-.187	.143	-.109	.150	.115	.127
	income	-1.099	.684	-1.036	.726	.002	.609
	cancer history	1.189	2.558	3.161	2.759	2.557	2.284
	Psycho-Active Medication	1.460	2.604	1.208	2.776	1.627	2.302
	Distress Cluster	11.44***	2.600	12.20***	2.853	12.65***	2.327
	test result	-2.387	1.215	-.504	1.279	-.936	1.080
3	age	-.188	.143	-.109	.151	.115	.127
	income	-1.138	.690	-1.055	.731	-.015	.614
	cancer history	1.336	2.581	3.267	2.788	2.621	2.299
	Psycho-Active Medication	1.248	2.641	1.095	2.808	1.512	2.329
	Distress Cluster	11.82***	2.696	12.41***	2.927	12.84***	2.387
	test result	-2.53*	1.248	-.612	1.321	-1.046	1.119
	NFC Total Score	-.050	.089	-.032	.092	-.032	.079

R^2 = .082, F (4,100) = 2.138, p = .682	R^2 = .045, F (4,99) = 2.174, p = .078	R^2 = .026, F (4,93) = 1.662, p = .165
Δ R^2 = .203, F (2,94) = 13.350, p < .0001	Δ R^2 = .159, F (2,93) = 4.965, p < .0001	Δ R^2 = .300, F (2,94) = 22.215, p < .0001
Δ R^2=.002, F (1,93) =.314, p = .567	Δ R^2 = .001, F (1,92) = .125, p = .724	Δ R^2 = .003, F (1,93) = .449, p = .505
R^2 = .234, F (7,100) = 5.356, P < .0001	R^2 = .186, F (7,99) = 4.233, p < .0001	R^2 = .320, F (4,93) = 7.735, p < .0001

Time 2 General Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs significantly predicted general distress at Time 2 (see Table 3.20). The second step, which added the control variables baseline distress and test results, resulted in an additional 26% of the variance in general distress at Time 2 (see Table 3.20). The addition of the NFC total score to the equation accounted for an additional less than 1% of the variance in general distress at Time 2, with the final model accounting for 33% of the variance in Time 2 general distress. In the final model, lower total yearly family income and greater baseline distress were the only significant individual predictors of Time 2 cancer-specific distress (see Table 3.20).

Table 3.20 Coefficients for the 5 NFC Total Scale Predicting General Distress at Times 2,3, and 4

Model		Time 2		Time 3		Time 4	
		B	SE	B	SE	B	SE
1	age	-.002	.004	.000	.004	.001	.003
	income	-0.06**	.020	-0.05*	.022	-.018	.017
	cancer history	.055	.075	.074	.081	.062	.062
	Psycho-Active Medication	.060	.076	.091	.082	.075	.063
2	age	.002	.004	.005	.004	.005	.003
	income	-0.05**	.017	-.032	.018	-.006	.013
	cancer history	.011	.065	.029	.068	.025	.049
	Psycho-Active Medication	.068	.065	.113	.069	.093	.049
	Distress Cluster	0.42***	.066	0.46***	.070	0.40***	.050
	test result	.013	.031	-.016	.032	-.006	.023
3	age	.002	.004	.005	.004	.005	.003
	income	-0.05**	.017	-.031	.018	-.005	.013
	cancer history	.007	.065	.025	.069	.024	.049
	Psycho-Active Medication	.074	.066	.118	.069	.095	.050
	Distress Cluster	0.40***	.068	0.45***	.073	0.40***	.051

Table 3.20 – Continued

	test result	.018	.031	-.011	.033	-.004	.024

	NFC total score	.002	.002	.002	.002	.001	.002

Time1	Time 2	Time 3
R^2 = .075, F (4,102) = 3.059, p = .020	R^2 = .026, F (4,100) = 1.662, p = .165	R^2 = -.004, F (4,99) = .893, p = .471
ΔR^2 = .261, F (2,96) = 19.964, p < .0001	ΔR^2 = .300, F (2,94) = 22.215, p < .0001	ΔR^2 = .395, F (2,97) = 33.580, p < .0001
ΔR^2 = .004, F (1,95) = .539, p = .464	ΔR^2 = .003, F (1,93) = .449, p = .505	ΔR^2 = .001, F (1,96) = .179, p = .673
R^2 = .330, F (7,102) = 8.167, p < .0001	R^2 = .320, F (7,93) = 7.735, p < .0001	R^2 = -.389, F (7,99) = 10.378, p < .0001

Predicting Distress at 3-months post-results (Time 3)

Time 3 Cancer-Specific Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs failed to significantly predict cancer distress at Time 3 (see Table 3.19). The second step, which added the control variables baseline distress and test results, resulted in an additional 16% of the variance in cancer-specific distress at Time 3 (see Table 3.19). The addition of the NFC total score accounted for an additional less than 1% of the variance in cancer-specific distress at Time 3, with the final model accounting for 17% of the variance in Time 3 cancer-specific distress. In the final model, greater baseline distress was only significant individual predictor of Time 3 cancer-specific distress (see Table 3.19).

Time 3 General Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs did not significantly predict general distress at Time 3 (see Table 3.20). The second step, which added the control variables

baseline distress and test results, resulted in an additional 30% of the variance in general distress at Time 3 (see Table 3.20). The addition of the NFC total score to the equation accounted for an additional less than 1% of the variance in general distress at Time 3, with the final model accounting for 32% of the variance in Time 3 general distress. In the final model, greater baseline distress was the only significant individual predictors of Time 3 cancer-specific distress (see Table 3.20).

Predicting Distress at 6-months post-results (Time 4)

Time 4 Cancer-Specific Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs failed to significantly predict cancer distress at Time 4 (see Table 3.19). The second step, which added the control variables baseline distress and test results, resulted in an additional 25% of the variance in cancer-specific distress at Time 4 (see Table 3.19). The addition of the NFC total score accounted for an additional less than 1% of the variance in cancer-specific distress at Time 4, with the final model accounting for 22% of the variance in Time 4 cancer-specific distress. In the final model, only greater baseline distress significantly predicted Time 4 cancer-specific distress (see Table 3.19).

Time 4 General Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs did not significantly predict general distress at Time 4 (see Table 3.20). The second step, which added the control variables baseline distress and test results, resulted in an additional 40% of the variance in general distress at Time 4 (see Table 3.20). The addition of the NFC total score accounted for an additional less than 1% of the variance in general distress at Time 4, with the final model accounting for 39% of the variance in Time 4 general distress. In the final model, greater use of psychoactive medication (marginally)

and greater baseline distress were the only significant individual predictors of Time 4 cancer-specific distress (see Table 3.20).

Hypothesis 3: Mediation Analysis

Mediation analyses were used to examine the meditational effects of avoidant and active coping on the relationship between the NFC total score and cancer-specific and general distress post-results for breast cancer genetic testing. The COPE was only measured at Time 1 and Time 3. As such, the bulk of the analyses focused on these two time periods. However, analyses were also conducted with Time 2 and Time 4 outcome variables. This was in order to determine if a trend existed in the mediation relationships between the significant NFC variables listed above and distress as measured at Time 1, 2, 3 and 4. Both Time 1 and Time 3 coping variables were entered into the equation to predict distress at Time 3 and Time 4. The Time 1 coping variables were entered as covariates. For correlations between the COPE and NFC variable see Table 1.

NFC Total Score

Mediating Distress at Baseline (Time 1)

Cancer-Specific

A significant mediation was observed of avoidant coping (but not active coping) on the influence of the total NFC score on cancer-specific distress at baseline (see Tables 3.21).

Table 3.21 Mediation of NFC Total Scale on Cancer-Specific Distress through Avoidant and Active Coping at Time 1

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**β**	**p**	**B**	**p**	**β**	**p**	**β**	**P**	**B**	**Lower**	**Upper**
NFC Total (avoidant)	.05	.04	2.14	.00	.16	.07	.05	.46	.10	.0213	.2089

Table 3.21 - Continued

NFC Total (active)	.03	.37	.19	.32		.01	-.0073	.0524
Total						.10	.0213	.2089

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

General Distress

A significant mediation was observed of avoidant coping (but not active coping) on the influence of the total NFC score on general distress at baseline (see Tables 3.22).

Table 3.22 Mediation of NFC Total Scale on General Distress through Avoidant and Active Coping at Time 1

									Indirect effect		
	Path a		**Path b**		**Path c**		**Path c'**		**Point estimate**	**Bca 95% CI**	
Scales	**B**	**P**	**B**	**p**	**β**	**p**	**β**	**p**	**B**	**Lower**	**Upper**
NFC Total (avoidant)	.05	.04	.06	.00	.00	.03	.00	.20	.00	.0005	.0052
NFC Total (active)	.04	.33	-.01	.01					-.00	-.0024	.0005
Total									.00	.0005	.0052

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Table 3.22 - Continued

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Mediating Distress at Time 2 (1-week post results) with Time 1 Coping Variables

Cancer-Specific

A significant mediation was observed of avoidant coping (but not active coping) on the influence of the NFC total score on cancer specific distress at Time 2 (see Table 3.23).

Table 3.23 Mediation of NFC Total Scale on Cancer-Specific Distress through Avoidant and Active Coping at Time 2

									Indirect effect		
	Path a		**Path b**		**Path c**		**Path c'**		**Point estimate**	**Bca 95% CI**	
Scales	**B**	**P**	**B**	**p**	**β**	**p**	**β**	**P**	**B**	**Lower**	**Upper**
NFC Total (avoidant)	.05	.02	2.11	.00	.15	.12	.01	.87	.11	.0405	.2181
NFC Total (active)	.06	.17	.45	.04					.02	-.0080	.1133
Total									.14	.0399	.2563

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

General Distress

A significant mediation was observed of avoidant coping (but not active coping) on the influence of the total NFC on general distress at Time 2 (see Table 3.24).

Table 3.24 Mediation of NFC Total Scale on General Distress through Avoidant and Active Coping at Time 2

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**B**	**p**	**β**	**p**	**β**	**P**	**B**	**p**	**B**	**Lower**	**Upper**
NFC Total (avoidant)	.05	.04	.05	.00	-.01	.03	.00	.18	.00	.0007	.0057
NFC Total (active)	.04	.34	-.00	.95					.00	-.0010	.0006
Total									.00	.0005	.0053

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

3.2.1. Discussion

The first hypothesis stated that women who opted for genetic testing would score higher on the NFC total scale than women who opted out of testing. The hypothesis was not supported. Again, this may be due to the low number of women who opted out of test relative to those who chose to do so (only 20 of the 108 women opted out of testing).

The second hypothesis stated that NFC would significantly predict cancer-specific and general distress beyond the variance accounted for by other previously determined factors at the four time points (baseline, 1-week, 3-months and 6-months). Another goal of this section was to compare the results of the combined NFC scale as a predictor of cancer-specific and general distress to the findings from analyses using individual subscales as predictors. Based on the data, the individual NFC scale scores appeared to be better predictors of specific and

general distress. Though the higher total score predicted both forms of distress at baseline, it failed to do so at any other time point. It was likely that the effects of the individual scales observed above, when combined into a single score, were lost due to the lack of predictive power of the other scales, and to the opposing relationships observed for a number of the scales. Therefore, the NFC total score may not be the best choice to examine the relationship between need for closure and distress. This was consistent with studies suggesting that NFC should not be used as a unidimensional scale (Manneti et al, 2002).

The third hypothesis stated that coping would mediate the effects of the NFC total scale on cancer-specific and general distress. Mediation analysis was only performed at baseline as it was the only time period significantly predicted by the total NFC score. The hypothesis was supported. The NFC total scale was significantly mediated by avoidant coping for both cancer-specific and general distress, suggesting, like before, that a high need for closure conveyed through a desire to avoid any disagreeable information, may lead to high levels of distress.

3.3 Analysis of the Relationship between Distress, Testing and the Urgency and Permanency Scales

Hypothesis 1

A MANCOVA was used to determine if a significant difference existed between those who opted for testing and those who did not with the NFC urgency and permanency subscales as the dependent variables. Age, total family income, use of psychoactive drugs, and previous cancer history were entered into the equation as covariates. There was no significant difference between the two groups (had the test or did not) in terms of the either urgency or permamnency, Mult. $F(2, 101) = .451$, $p = .638$, partial $\eta^2 = .009$; urgency : $F(5, 107) = .738$, $p = .597$, partial $\eta^2 = .035$; permanency : $F(5, 107) = .432$, $p = .826$, partial $\eta^2 = .021$.

Hypothesis 2

Predicting Distress at Baseline (Time 1)

Baseline Cancer-Specific Distress

The first step of the model (with background variables) accounted for 5% of the variance associated with cancer-specific distress at baseline (see Table 3.25), but none of the individual variables were significant. The second step, which added the NFC urgency and permanency scores to the equation, resulted in an additional 14% of the variance. The final model accounted for 18% of the variance in baseline distress with lower age, greater use of psychoactive drugs, greater NFC-urgency, and lower NFC-permanency significantly predicting cancer distress at baseline (see Table 3.25).

Table 3.25 Coefficients for the Urgency and Permanency Scales Predicting Cancer-Specific Distress at Baseline

Model		B	SE
1	age	-.243	.15
	income	-1.160	.70
	cancer history	.390	2.65
	Psycho-Active Medications	3.370	2.65
		R^2 = .046, F (4,106) = 2.286, p = .065	
2	Age	-0.28*	.14
	Income	-.870	.65
	cancer history	.081	2.46
	Psycho-Active Medications	5.17*	2.50
	NFC Urgency	0.23*	.09
	NFC Permanency	-0.50**	.14
		ΔR^2 = .144, F (2,100) = 9.311, p < .001	
		R^2 = .180, F (6,106) = 4.867, p < .0001	

SE = standard error.
* p <. 05; ** p < .01; *** p < .001.

Baseline General Distress

The first step of the model (with background variables) accounted for 6% of the variance associated with general distress at baseline, but only lower total yearly family income was a significant individual predictor (see Table 3.26). The second step, which added the NFC urgency and permanency score to the equation, resulted in an additional 13% of the variance in baseline general distress. The final model accounted for 18% of the variance in general distress. Lower total yearly family income, greater use of psychoactive drugs, greater NFC-urgency, and lower NFC-permanency significantly predicted general distress at baseline (see Table 10 3.26).

Table 3.26 Coefficients for the Urgency and Permanency Scales Predicting General Distress at Baseline

Model		B	SE
1	Age	.003	.004
	Income	-0.05**	.017
	cancer history	.060	.064
	Psycho-Active Medications	.110	.064
		R2 = .063, F (4,107) = 2.802, p = .030	
2	Age	.000	.003
	Income	-0.04**	.016
	cancer history	.060	.060
	Psycho-Active Medications	0.15*	.061
	NFC Urgency	0.01*	.002
	NFC Permanency	-0.01**	.003
		∆ R2 = .130, F (2,101) = 8.478, p < .0001	
		R2 = .182, F (6,107) = 4.965, p < .0001	

SE = standard error.
* p <. 05; ** p < .01; *** p < .001.

Predicting Distress at 1-week post-results (Time 2)

Time 2 Cancer-Specific Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs failed to significantly predict cancer distress at Time 2 (see Table 3.27). The second step, which added the control variables baseline distress and test results, resulted in an additional 20% of the variance in cancer-specific distress at Time 2 (see Table 3.27). The addition of the NFC urgency and permanency scales accounted for an additional 1% of the variance in cancer-specific distress at Time 2, with the final model accounting for 24% of the variance in Time 2 cancer-specific distress. In the final model, greater baseline distress and negative test results (marginally) were the only significant individual predictors of Time 2 cancer-specific distress (see Table 3.27).

Table 3.27 Coefficients for the NFC Urgency and Permanency Subscales Predicting Cancer-Specific Distress at Times 2,3, and 4

Model		Time 2		Time 3		Time 4	
		B	SE	B	SE	B	SE
1	Age	-.263	.157	-.235	.159	-.005	.142
	Income	-1.427	.762	-1.497	.781	-.365	.694
	cancer history	1.901	2.843	4.637	2.954	3.502	2.592
	Psycho-Active Medication	.256	2.877	.282	2.984	.768	2.610
2	Age	-.187	.143	-.109	.150	.115	.127
	Income	-1.099	.684	-1.036	.726	.002	.609
	cancer history	1.189	2.558	3.161	2.759	2.557	2.284
	Psycho-Active Medication	1.460	2.604	1.208	2.776	1.627	2.302
	Distress Cluster	11.44***	2.600	12.19***	2.853	12.65***	2.327
	test result	-2.387	1.215	-.504	1.279	-.936	1.080
3	Age	-.222	.145	-.123	.154	.090	.129
	Income	-1.051	.687	-1.022	.734	.045	.613
	cancer history	1.246	2.569	3.195	2.793	2.638	2.291
	Psycho-Active Medication	1.826	2.643	1.287	2.826	1.735	2.330
	Distress Cluster	9.93**	2.897	11.57**	3.235	11.71***	2.581
	test result	-2.425	1.238	-.547	1.320	-1.075	1.108
	NFC Urgency	.029	.098	-.005	.105	-.021	.087

Table 3.27 - Continued

Time 2	Time 3	Time 4
R^2 = .044, F (4,100) = 2.138, p = .082	R^2 = .045, F (4,95) = 2.174, p = .078	R^2 = -.017, F (4,98) = .570, p = .685
Δ R^2 = .203, F (2,94) = 13.350, p < .0001	Δ R^2 = .159, F (2,93) = 9.745, p < .0001	Δ R^2 = .248, F (2,96) = 16.333, p < .0001
Δ R^2 = .014, F (2,92) = .944, p = .393	Δ R^2 = .003, F (2,91) = .183, p = .833	Δ R^2 = .013, F (2,94) = .839, p = .435
R^2 = .238, F (8,100) = 4.911, p < .0001	R^2 = .179, F (8,99) = 3.704, p = .001	R^2 = .223, F (8,94) = 4.653, p < .0001

Time 2 General Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs significantly predicted general distress at Time 2 (see Table 3.28). The second step, which added the control variables baseline distress and test results, resulted in an additional 26% of the variance in general distress at Time 2 (see Table 3.28). The addition of the NFC urgency and permanency scales to the equation accounted for an additional 1% of the variance in general distress at Time 2, with the final model accounting for 33% of the variance in Time 2 general distress. In the final model, lower total yearly family income and greater baseline distress were the only significant individual predictors of Time 2 cancer-specific distress (see Table 3.28).

Table 3.28 Coefficients for the NFC Urgency and Permanency Subscales Predicting Cancer-Specific Distress at Times 2,3, and 4

Model		Time 2		Time 3		Time 4	
		B	SE	B	SE	B	SE
1	Age	-.002	.004	.000	.004	.001	.003
	Income	-0.06**	.020	-0.05*	.022	-.018	.017
	cancer history	.055	.075	.074	.081	.062	.062

Table 3.28 - Continued

	Psycho-Active Medication	.060	.076	.091	.082	.075	.063
2	Age	.002	.004	.005	.004	.005	.003
	total yearly family income	-0.05**	.017	-.032	.018	-.006	.013
	personal cancer history	.011	.065	.029	.068	.025	.049
	Psycho-Active Medication	.068	.065	.113	.069	.093	.049
	Distress Cluster	0.42***	.066	0.46***	.070	0.40***	.050
	test result	.013	.031	-.016	.032	-.006	.023
3	Age	.001	.004	.004	.004	.003	.003
	total yearly family income	-0.05**	.017	-.031	.018	-.002	.013
	personal cancer history	.009	.065	.029	.069	.027	.047
	Psycho-Active Medication	.079	.066	.119	.070	0.11*	.047
	Distress Cluster	0.38***	.074	0.42***	.080	0.33***	.053
	test result	.017	.031	-.015	.033	-.005	.022
	NFC Urgency	.002	.002	.001	.003	.002	.002
	NFC Permanency	-.004	.004	-.005	.004	-0.01**	.003

Time 2	Time 3	Time 4
R^2 = .075, F (4,102) = 3.059, p = .020	R^2 = .026, F (4,96) = 1.662, p = .165	R^2 = -.004, F (4,99) = .893, p = .471
ΔR^2 = .261, F (2,96) = 19.964, p<.0001	ΔR^2 = .300, F (2,94) = 22.215,p < .0001	ΔR^2 = .395, F (2,97) = 33.580, p < .0001
ΔR^2 = .010, F (2,94) = .736, p = .482	ΔR^2 = .008, F (2,92) = .599, p = .551	ΔR^2 = .063, F (2,95) = 5.949, p = .004
R^2 = .329, F (8,102) = 7.257, p < .0001	R^2 = .319, F (8,92) = 6.884, p < .0001	R^2 = .450, F (8,103) = 11.555, p < .0001

Predicting Distress at 3-months post-results (Time 3)

Time 3 Cancer-Specific Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs failed to significantly predict cancer distress at Time 3 (see Table 3.27). The second step, which added the control variables baseline distress and test results, resulted in an additional 16% of the variance in cancer-

specific distress at Time 3 (see Table 3.27). The addition of the NFC urgency and permanency scales accounted for an additional 1% of the variance in cancer-specific distress at Time 3, with the final model accounting for 18% of the variance in Time 3 cancer-specific distress. In the final model, greater baseline distress was the only significant individual predictors of Time 3 cancer-specific distress (see Table 3.27).

Time 3 General Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs did not significantly predict general distress at Time 3 (see Table 3.28). The second step, which added the control variables baseline distress and test results, resulted in an additional 30% of the variance in general distress at Time 3 (see Table 3.28). The addition of the NFC urgency and permanency scales to the equation accounted for an additional 1% of the variance in general distress at Time 3, with the final model accounting for 32% of the variance in Time 3 general distress. In the final model, greater baseline distress was the only significant individual predictors of Time 3 cancer-specific distress (see Table 3.28).

Predicting Distress at 6-months post-results (Time 4)

Time 4 Cancer-Specific Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs failed to significantly predict cancer distress at Time 4 (see Table 3.27). The second step, which added the control variables baseline distress and test results, resulted in an additional 25% of the variance in cancer-specific distress at Time 4 (see Table 3.27). The addition of the NFC urgency and permanency scales accounted for an additional 1% of the variance in cancer-specific distress at Time 4, with the final model accounting for 22% of the variance in Time 4 cancer-specific distress. In the final model, only greater baseline distress significantly predicted Time 4 cancer-specific distress (see Table 3.27).

Time 4 General Distress

The initial model with the background variables age, total yearly family income, personal cancer history, and use of psychoactive drugs did not significantly predict general distress at Time 4 (see Table 3.28). The second step, which added the control variables baseline distress and test results, resulted in an additional 40% of the variance in general distress at Time 4 (see Table 3.28). The addition of the NFC urgency and permanency scales accounted for an additional 6% of the variance in general distress at Time 4, with the final model accounting for 45% of the variance in Time 4 general distress. In the final model, greater use of psychoactive medication, greater baseline distress and the lower NFC-permanency scale were the only significant individual predictors of Time 4 cancer-specific distress (see Table 3.28).

Hypothesis 3: Mediation Analysis

Mediation analyses were used to examine the meditational effects of avoidant and active coping on the relationship between the NFC urgency and permanency scales and cancer-specific and general distress post-results for breast cancer genetic testing. The COPE was only measured at Time 1 and Time 3. As such, the bulk of the analyses focused on these two time periods. However, analyses were also conducted with Time 2 and Time 4 outcome variables. This was in order to determine if a trend existed in the mediation relationships between the significant NFC variables listed above and distress as measured at Time 1, 2, 3 and 4. Both Time 1 and Time 3 coping variables were entered into the equation to predict distress at Time 3 and Time 4. The Time 1 coping variables were entered as covariates.

NFC Scale (Urgency and Permanency)

Mediating Distress at Baseline (Time 1)

Baseline Cancer-Specific Distress

A significant mediation was observed of avoidant coping (but not active coping) on the influence of both urgency and permanency on cancer-specific distress at baseline (see Table 3.29 and Table 3.30, respectively).

Table 3.29 Mediation of NFC Urgency Subscale on Cancer-Specific Distress t through Avoidant and Active Coping at Time 1

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**β**	**P**	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**Lower**	**Upper**
Urgency (avoidant)	.06	.01	1.91	.00	.21	.02	.09	.24	.11	.0367	.2105
Urgency (active)	.06	.15	.19	.33					.01	-.0058	.0704
Total									.13	.0427	.2373

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Table 3.30 Mediation of NFC Permanency Subscale on Cancer-Specific Distress through Avoidant and Active Coping at Time 1

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**β**	**p**	**β**	**P**	**β**	**p**	**β**	**p**	**β**	**Lower**	**Upper**
Permanency (avoidant)	-.10	.01	1.91	.00	-.50	.00	.09	.24	.11	.0367	.2105
Permanency (active)	.06	.15	.19	.33					-.01	-.0701	.0103
Total									-.21	-.3907	-.0535

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Baseline Distress (General)

A significant mediation was observed of avoidant coping (but not active coping) on the influence of both urgency and permanency on general distress at baseline (see Table 3.31 and Table 3.32, respectively).

Table 3.31 Mediation of NFC Urgency Subscale on General Distress through Avoidant and Active Coping at Time 1

	Path a		Path b		Path c		Path c'		Indirect effect: Point estimate	Indirect effect: Bca 95% CI	
Scales	**β**	**p**	**β**	**p**	**β**	**p**	**β**	**p**	**B**	**Lower**	**Upper**
Urgency (avoidant)	.06	.01	.06	.00	.01	.03	.00	.17	.00	.0012	.0064
Urgency (active)	.07	.12	-.01	.03					.00	-.0031	.0002
Total									.00	.0000	.0054

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Table 3.32 Mediation of NFC Permanency Subscale on General Distress through Avoidant and Active Coping at Time 1

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**β**	**P**	**β**	**p**	**β**	**p**	**B**	**P**	**B**	**Lower**	**Upper**
Permanency (avoidant)	-.10	.01	.06	.00	.01	.00	-.01	.02	-.01	-.0107	-.0017
Permanency (active)	-.06	.35	-.01	.01					-.00	.0030	.0008
Total									-.01	-.0096	-.0009

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Mediating Distress at Time 2 (1-week post results) with Time 1 Coping Variables

Cancer-Specific

A significant mediation was observed of avoidant coping (but not active coping) on the influence of both urgency and permanency on cancer-specific distress at Time 2 (see Table 3.33 and Table 3.34, respectively).

Table 3.33 Mediation of NFC Urgency Subscale on Cancer-Specific Distress through Avoidant and Active Coping at Time 2

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**β**	**p**	**β**	**p**	**β**	**p**	**B**	**p**	**B**	**Lower**	**Upper**
Urgency (avoidant)	.06	.01	1.95	.00	.22	.03	.06	.48	.17	.0479	.2348
Urgency (active)	.08	.06	.43	.05					.04	-.0012	.1204
Total									.17	.0653	.2746

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Table 3.34 Mediation of NFC Permanency Subscale on Cancer-Specific Distress through Avoidant and Active Coping at Time 2

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**β**	**p**	**β**	**p**	**β**	**p**	**B**	**P**	**B**	**Lower**	**Upper**
Permanency (avoidant)	.09	.01	1.95	.00	-.40	.02	-.19	.18	-.19	-.3374	-.0340
Permanency (active)	.06	.41	.43	.05					-.03	.1295	.0253
Total									-.21	-.3911	-.0087

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples.

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

General Distress

A significant mediation was observed of avoidant coping (but not active coping) on the influence of both urgency and permanency on general distress at Time 2 (see Table 3.35 and Table 3.36, respectively).

Table 3.35 Mediation of NFC Urgency Subscale on General Distress through Avoidant and Active Coping at Time 2

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**β**	**P**	**β**	**p**	**β**	**p**	**B**	**p**	**B**	**Lower**	**Upper**
Urgency (avoidant)	.06	.01	.05	.00	.01	.01	.00	.10	.00	.0008	.0057
Urgency (active)	.07	.12	-.00	.89					-.00	-.0015	.0008
Total									.00	.0008	.0056

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

Table 3.36 Mediation of NFC Permanency Subscale on General Distress through Avoidant and Active Coping at Time 2

									Indirect effect		
	Path a		Path b		Path c		Path c'		Point estimate	Bca 95% CI	
Scales	**β**	**p**	**β**	**p**	**β**	**p**	**B**	**p**	**B**	**Lower**	**Upper**
Permanency (avoidant)	-.10	.01	.05	.00	.01	.00	.01	.07	-.01	-.0093	-.0018
Permanency (active)	.06	.35	-.00	.89					.00	-.0008	.0019
Total									-.01	-.0091	-.0015

Note: BCa = bias corrected and accelerated

CI = confidence interval; 2000 bootstrap samples

Path a = IV to Mediators

Path b = Direct effects of mediators on DV

Path c = Total effect of IV on DV

Path c' = Direct effect of IV on DV

3.3.1. Discussion

The first hypothesis stated that women who opted for genetic breast cancer testing would score higher on the NFC urgency and the permanency scales. This hypothesis was not supported. There was no significant difference between women who opted for testing and those who did not on the urgency and permanency scales. This may be due to the lack of sufficient numbers to detect the effect. Of the 108 women who participated in the study, only 20 opted out of testing.

The second hypothesis stated that the urgency and permanency scales would significantly predict cancer-specific and general distress beyond the variance accounted for by

other variables. This hypothesis was partially supported. Higher scores on the urgency subscale and lower scores on the permanency scale were associated with higher levels of distress at baseline for both forms of distress. Another aim of this section was to determine if any additional information could be gained by using the NFC urgency and permanency subscales in the relationship between NFC and cancer-specific and general distress across the four time periods beyond the individual subscales.

Much like the total score in the section above, both urgency and permanency only played a factor during baseline. More specifically, higher levels of urgency and lower levels of permanency predicted higher levels of cancer-specific and general distress at baseline.

The third hypothesis stated that coping would mediate the effects of the urgency and permanency scales on cancer-specific and general distress. Mediation analyses were only run at Time 1 and Time 2 (for trend purposes). The hypothesis was supported at baseline. Avoidant coping significantly mediated the effects of both urgency and permanency on distress at Time 1 (baseline) and Time 2 (1-week). Active coping had no effect. This once again suggested that when need for closure was high, avoidant coping strategies were likely to be used. From prior research we know that avoidant behaviors lead to higher levels of distress. The data suggested that NFC was an important factor in determining how much distress an individual experienced at baseline, but these effects could have been attenuated by the selected coping strategy. More specifically, if an avoidant strategy was selected, then distress was more likely to result.

3.4 Additional Analyses

A MANOVA was conducted to determine if NFC scores differed by test results for the various NFC scales and conceptualizations. The multivariate F was significant (Multi. $F(5,77) = 1.943$, $p < .05$), but only the discomfort with ambiguity scale was significantly different at the $p < .05$ level ($F(6,81) = 2.528$, $p < .05$). The means for discomfort with ambiguity for the positive, negative and variant results were 31.42, 32.70 and 26.21, respectively. The positive and the

negative results were not significantly different from each other (mean diff. = -1.28, $p < .05$). The variant result, however, differed significant from both the positive result (mean diff. = -5.21, $p < .05$) and the negative result (mean diff. = -6.48, $p < .01$).

Additionally, Multiple Analysis of Variance (MANOVA) were conducted in order to determined if there was something unique about those who had complete data for all four time points and those who dropped out of the study or failed to provide data at any of the times points. None of the analyses were significant at the $p < .05$ level indicating that the completers did not differ significantly from the non-completers on demographics (age, education, income), baseline distress (cancer-specific and general), or any of the NFC subscales. Missing data did not appear to be a potential confound in the study.

Another MANOVA was conducted in order to see if those who had NFC data at time 4 (only period it was collected) differed from those who did not in terms of demographics and baseline distress. Again, the analysis was not significant at the $p < .05$ level.

CHAPTER 4

GENERAL DISCUSSION

The present study examined the role of NFC in the decision to undergo genetic testing in women who had been identified as being at risk for the development of breast cancer. Additionally, it examined the relationship between NFC and psychological distress following the receipt of genetic testing results, and the role coping strategies played in mediating those effects. To this end, the present study had three main hypotheses. The first hypothesis dealt with the likelihood that women high in NFC would be more likely than women low in NFC to agree to undergo genetic testing. The second proposed that NFC would uniquely predict levels of both general and cancer-specific distress following the disclosure of test results beyond the variance accounted for by previous cancer history, prior levels of distress, and testing results at 1-week, 3-months, and 6-months post-results. The third hypothesis proposed that the relationship between NFC and both cancer-specific and general distress would be mediated by coping styles (i.e. active vs. avoidant coping) at the various time point observed in this study.

Another goal of the present study was to determine if there were advantages to using the various conceptions of the NFC scales above the others. More specifically, did the total NFC or the urgency and permanency scales, provide more information about the relationship between genetic testing and need for closure than did the individual scale scores.

One of the biggest questions in this area of research (genetic testing and distress) has been does the testing situation result in distress over time. Numerous studies have shown that this has not been the case, and the data here also suggested the same. Data from this study indicated that distress was a function of two things. The first was the degree of discomfort an individual had with uncertainty; the second was the style of coping the individual selected in order to handle the stressors of the testing situation.

Consistent with Dougall et al. (2009), baseline distress was most predictive of later distress at Time 2 (1-week), Time 3 (3 months), and Time 4 (6-months). This may suggest that the later distress experienced by individuals with high levels of baseline distress was a result of a chronic stress that was exacerbated by the testing situation. Stated differently, the testing situation or results were not the cause of future distress but rather distress was a general pattern that these individuals display as a result of their overall risk for cancer (Dougall et al., 2009).

As mentioned before, few studies have examined the relationship between need for certainty and psychological distress following genetic testing for breast cancer. However, O'Neill et al. (2005) found that high levels of intolerance for uncertainty predicted high levels of distress post-test results in women with uninformative results. The current study generally supported these findings. A couple of the individual scales of the NFC were found to be consistent predictors of both cancer-specific and general distress, including high discomfort with ambiguity which is arguably the scale most closely related to the IUS (Intolerance for Uncertainty Scale)

Of the various NFC scales, the only consistent predictors of both cancer-specific and general distress across the four time periods (baseline to 6 months post-results) were greater discomfort with ambiguity and lower decisiveness. While greater closed-mindedness was a significant predictor at Time 2 (cancer-specific) and Time 3 (general), it was inconsistent across the time periods making it hard to argue for its use instead of the other individual subscales.

Similarly, the inconsistency of the urgency and permanency scales would also provide little additional information beyond what was already obtained from the ambiguity and decisiveness subscales. Adding more validity to this perspective was the fact that the urgency scale was composed, in part, of the discomfort with ambiguity and decisiveness scales, and, in any time frame in which urgency appears as a significant predictor, either (or both) discomfort with ambiguity or decisiveness were significant predictors. Likely then, the driving force behind

the relationship between the urgency scale and distress was the relationship between distress and the discomfort with ambiguity and decisiveness subscales. For the sake of clear interpretation, it would be best to focus mainly on the individual scales rather than the recombined scales as they offer little additional information beyond what was provided by the individual subscales, at least within this context. As such, the rest of this discussion will tighten its focus on the relationship between the five individual subscales and distress (cancer-specific and general).

Discomfort with ambiguity was the feeling of discomfort in the absence of closure. Decisiveness on the other hand was a strong desire to arrive at a decision as quickly as possible in order to secure some level of certainty. When taken together, a clear picture emerges at baseline. Individuals who were low on decisiveness (that is they did not have a strong need for quick closure), but yet had a strong discomfort with ambiguity, tended to be the individuals who experienced higher levels of cancer-specific distress at baseline. However, one-week post-results high discomfort with ambiguity and low closed-mindedness (the desire for permanence) were the best predictors of cancer distress. At three months post results, the amount of discomfort with ambiguity was what mattered most. More specifically, the more uncomfortable someone was with uncertainty, the more cancer-specific distress that person experienced independent of actual test results. Six months post results none of the NFC scales predicted distress.

A similar pattern was present for the influence of NFC on general distress. At baseline low decisiveness was associated with higher levels of distress. One-week post results general distress was predicted by high discomfort with ambiguity. At one month following results, closed-mindedness (attaining permanency by avoiding or ignoring additional information) was the strongest NFC predictor of general distress. At this period however, both high discomfort with ambiguity and low decisiveness were not significant. However, with a larger sample size, both may have been significant predictors of general distress at three-month post-results. At six

months post-results, low preference for order and low decisiveness were the most predictive of general distress. People with a high preference for order had a strong need for solidity in the environment. Thus, predictors of distress six months after receiving test results were a low need for structure and a low ability to make definitive decisions to bring about closure.

The findings from the present study were consistent with results from previous investigations. In particular, distress following genetic testing results was not related to the testing situation itself, but was associated with pretest levels of distress, cancer history, and coping styles (Croyle et al., 1997; Dougall et al., 2009; Lodder et al., 2001; Hamann et al., 2005). Other research has suggested that factors such as attitude towards uncertainty play a major role in determining if distress will occur following genetic testing (O'Neill et al., 2006). The results of the present study were consistent with these findings and showed that high discomfort with ambiguity and low decisiveness, primarily, were predictors of post-results distress. Furthermore, the effects of need for closure on post-results distress were dependent on the type of coping strategy selected. Specifically, the selection of an avoidant (rather than an active) coping strategy along with high need for closure predicted higher levels of distress. These findings were consistent with previous reports that distress following testing was mediated by an individual's choice of coping strategy (Dougall et al., 2009).

There were a number of limitations in the study, therefore caution should be taken when interpreting or generalizing the findings. One of the major limitations of the study was the homogeneity of the current sample—the entire sample was comprised of white females. While representative of the community from which it was drawn, it does make generalization to other groups more difficult. Additionally, the relatively small sample size made some of the analyses difficult to interpret. For example, it was difficult to make meaningful comparisons in the analyses of variance involving the willingness to undergo testing by NFC scores due to low numbers in the cells of women who opted out of testing. Future studies should look to add a higher number of minority women and, additionally, increase the overall

sample size to allow more sophisticated analyses, clearer interpretations, and broader generalizations.

Another limitation is that the NFC was only measured at Time 4. While the NFC is generally considered to be a stable personality characteristic, it is possible that the cancer genetic testing situation may be sufficiently powerful enough to change one's view of uncertainty. As such it would be interesting in future studies to have NFC measured at each time point in order to see if there is a change over time following the disclosure of testing results. It is however important to point out that in the present study the NFC scales was most predictive of distress in Times 1 and 2, but not near as much in time 4. This makes it unlikely the participants' NFC profile changed from Time 1 to Time 4 as, if that were the case, we would have expected the NFC scales to be more predictive of distress at Time 4 than at the other Time points. This was not the case.

It should also be pointed out that due to the large number of analyses in this study, the reader should be careful in their interpretations of the results as no corrections for Type 1 errors were made. In order to decrease the likelihood of Type 2 errors, we tolerated an increase in Type1. Future studies should focus on the analyses that were significant above in order to avoid having too many analyses increasing the probability of type 1 error.

In conclusion, a profile that emerges based on the above analyses where the individual is able to make quick decisions, has a high preference for structure, is willing to avoid additional information that may contradict what they have decided, and are more comfortable with ambiguity, seems to provide the best immunization against general distress. However, while immunizing them against distress this attitude towards uncertainty may not be the most constructive way to handle a situation as potentially life threatening as breast cancer. The profile is of an individual who rushes to closure and once there tries hard to keep that knowledge from being challenged. However, the problem is that there is no certainty from breast cancer genetic testing, and therefore continued vigilance is necessary. Once an answer

is received these women are likely to avoid new information (continued check-ups, etc.) in favor of the “certainty” they have attained. As such, genetic counseling professionals working with women who display the profile above may need to spend more time both before and after testing ensuring that the women understand the inherent uncertainty built into breast cancer genetic testing.

As for coping, the results are consistent with many of the studies described above, including Dougall et al. (2009). More specifically, avoidant coping, more so than active coping, resulted in higher levels of distress. In the current study, avoidant coping consistently mediated the effect of NFC on distress following testing. It would seem, based on the results of this study, is that the best step to take in order to prepare women who opt for genetic testing for whatever results may come, is to first determine their general style of coping with distress, and implement interventions to decrease avoidance.

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